

1934
A
167

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

GoogleTM books

<https://books.google.com>



Bibliothek des Deutschen Museums



057002096470

No. 18.—June, 1871.

DESCRIPTIVE CATALOGUE
OF
FOWLER'S
PATENT MACHINERY
FOR
STEAM CULTIVATING
AND GENERAL PURPOSES.

Manufactured by
JOHN FOWLER AND CO.,
ENGINEERS,

Steam Plough Works, Leeds, Yorkshire.

LONDON OFFICES: 71, CORNHILL, E.C.

TERMS: NETT CASH IN A MONTH FROM DELIVERY.

*References to Persons in almost every country of the world now using these Machines
can be had on Application.*

Leeds:
PRINTED BY EDWARD BAINES AND SONS.

1871.

934
A
167

To enable intending Purchasers to obtain the Machinery best suited to their particular requirements, we have arranged to send a competent person, free of expense, to see their Farms and advise with them on the subject.

By giving two or three days' notice, any class of machinery may be seen in operation near Leeds.

In sending orders for Duplicates, we PARTICULARLY REQUEST that the number on the part broken may be quoted, as all the castings are properly marked, and careful attention to this point may save very CONSIDERABLE DELAY in sending the parts required.

Testimonials can be had on application.

Imr v. K. H. W. W. W. W.

Städtische Museen

Direktor Dr. H. Stolzberg

Digitized by Google

F o w l e r

1870 Max Eyth konstruierte die Seiltrommel .

Um diese Zeit war M.E. bei Fowler.

Städtische Museen

Direktor Dr. A. Stolberg

No. 18.—June, 1871.

DESCRIPTIVE CATALOGUE

OF

FOWLER'S

Patent Agricultural Steam Machinery

FOR

CULTIVATING AND GENERAL PURPOSES.

MANUFACTURED BY

JOHN FOWLER & CO., ENGINEERS,

Steam Plough Works, Leeds, Yorkshire.

LONDON OFFICES: 71, CORNHILL, E.C.

References to Persons in almost every Country of the World now using these Machines may be had on Application.

Leeds:

PRINTED BY EDWARD BAINES AND SONS.

1871.

Digitized by Google



1934 a 167
0

INTRODUCTORY REMARKS.

FROM the results of numerous experiments carried out by the late John Fowler in connection with Steam tillage, and from careful observation of the practical working of Steam Ploughing Machinery during a series of years, we have come to the conclusion that it is impossible for any single system to work equally advantageously under all circumstances. Unlike most other machinery, a Steam Cultivating Apparatus is required to work under totally opposite conditions at different times, and often under circumstances where nothing whatever has been done to assist its introduction. The general formation, the conditions and requirements of the country, the nature of the soil, the size and arrangement of the holdings, and the available capital, are all items which are sure to influence the possibility of applying a certain class of Steam Ploughing Machinery to advantage, and may demand important modifications in its construction. Thus we now manufacture four distinctly different classes of Tackle, a full description of which is given in the following pages. They are briefly enumerated as follows :—

No. 1 is worked by two Traction Engines, fitted with winding drums, moving along opposite headlands. This arrangement requires no fixtures in the field, is most suitable for general purposes, and is especially adapted to do, besides the heavy work of cultivation, all the lighter operations of the farm, such as harrowing, rolling, drilling, &c. The rope also may be used by means of its direct pull with advantage for pulling out roots and stones, tearing down trees, clearing land, &c. Although the first cost of the Tackle may appear heavy, it undoubtedly has proved to be the cheapest in the long run, wherever the Engines have been fully employed.

No. 2 is worked by a Traction Engine, fitted with a clip drum moving along the headland in connection with our Patent Anchor. This Tackle is well known to the agricultural public, and, where the fields are well laid out, is one that will do a given amount of work with a minimum expenditure of power.

No. 3 is worked by a Traction Engine fitted with two winding drums. Its specialty is that it can be worked either with a direct pull, Engine and Anchor moving along opposite headlands as in No. 2, or with the Engine stationary in one corner of the field; thus

enabling the machine to deal effectually with hilly land, badly-shaped enclosures, or wet condition of the soil—an advantage that will at once be apparent.

No. 4 is a cheap Tackle, adapted to be worked by a Portable Engine, and consisting of detached winding windlass, snatch blocks and claw anchors, &c.; suitable for those whose requirements do not warrant the purchase of the larger and more readily-applied systems.

We would call especial attention to the Implements (hereafter described) that are arranged to be worked with these Tackles. They are capable of performing all classes of tillage operations, and can be varied at pleasure to suit different circumstances.

Anchors, Ploughs, Cultivators, or any part of the machinery, can be supplied separately, if required.

With a view to the economical working of Steam Ploughing Machinery we consider the following principles to be essential: the direct pull on the implement without interference of pulleys and snatch-blocks, the use of the smallest possible amount of wire rope, great facility for moving the machinery from field to field, and the employment of a minimum of manual labour. In three of the described systems, but especially in the first, these conditions are fulfilled in the most complete manner. The horizontal position of the winding drum permits the working of the rope at any angle required by the direction of the furrow, and the Engine, with the complete winding apparatus attached to it, is at any moment ready to move itself and implements from field to field.

In the case of small holdings, where the fields, generally small, require frequent removals, it is essential that the machinery should be self-moving, and of the most compact description. Such holdings are scarcely able to employ the staff of men required for the working of any system, and the employment of Steam in such cases will not always repay the outlay absolutely necessary even for a small apparatus. We have, therefore, come to the conclusion (fully borne out by the experience of the last five years) that the proper way of working steam cultivation on small farms is for a number of Farmers to combine for this purpose, and employ the best Machinery of large size.

After fifteen years' experience, including carefully conducted experiments under the most varied conditions, we have come to the conclusion that Steel Wire Rope is the only practicable medium of communication between the Engine and the Implement. It is of great importance so to use this rope that its durability may be increased as much as possible; for no other part of the Apparatus will deteriorate so rapidly through improper usage. It must be kept well off the ground, especially in gravelly soils, and should be bent as little as possible, and then only over pulleys of large diameter.

The proper laying out of land on which Steam Cultivation has to be employed is of the utmost importance for its final success. The expenses of cultivation may, by using judgment in this respect, be reduced by more than one-half on a well laid out estate compared with an irregular holding. Independently of the advantages to be gained by the use of Steam Power, the clearing out of old fences and trees will be a source of profit to the Farmer, as they harbour vermin and debar the progress of profitable agriculture.

In estimating the expense of Steam Cultivation, there are few who justly appreciate the great change that it effects in the character of the soil, both as regards the drainage and the cost of after-tillage. It is quite evident that when land has been once thoroughly broken up by Steam, every succeeding operation requires less power to effect it; and the experience of those who use Steam power proves that but one-half the number of these after operations is required, mainly because the work is more effectually done in every way.

In dealing with land the great point is command of labour. It will be found that no mechanical pulverisation is required, where the ordinary operations of breaking up are performed at the proper season and under proper circumstances. Aeration is the principal object of all Cultivation, and the rapid motion of the Steam-driven Implement so tears and breaks up the land that it remains in a loose, rough state, thus allowing the atmosphere to act upon the *subsoil* as well as on the upper part of the staple, and to pulverise the whole by degrees, and more thoroughly preparing it for the reception of the seed than any mechanical operation, however expensive. All treading being avoided, the rain and the roots of plants penetrate the subsoil without being intercepted by the indented path on which animals have trodden for years.

JOHN FOWLER & CO.

LIST OF PRIZES

GAINED BY

Fowler's Patent Steam Cultivating Machinery.

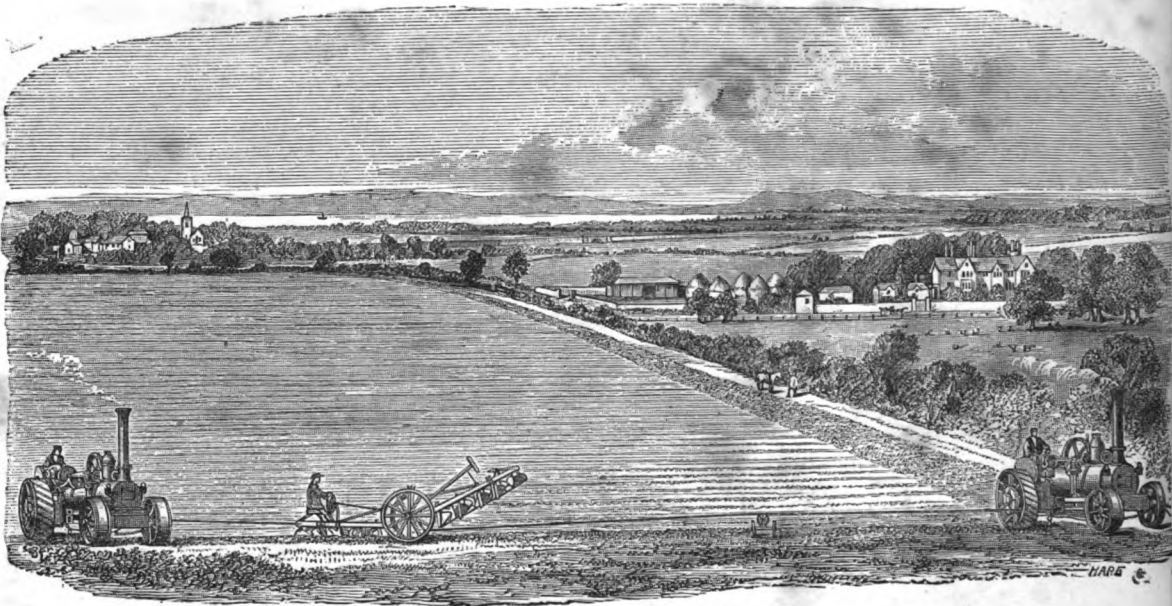
THE GOLD MEDAL, AT THE FRENCH AGRICULTURAL EXHIBITION IN 1856.

	£.
THE HIGHLAND SOCIETY'S PRIZE, at Stirling; October, 1857	200
THE ROYAL AGRICULTURAL SOCIETY'S PRIZE, at the Chester Meeting; in July, 1858	500
THE YORKSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Northallerton; August, 1858	50
LORD BOLTON'S PRIZE, at Northallerton; August, 1858	25
THE ROYAL AGRICULTURAL IMPROVEMENT SOCIETY OF IRELAND'S PRIZE, at Londonderry; August, 1858	50
THE SCOTCH FARMERS' PRIZE, at Stirling; October, 1858	50
THE ROYAL AGRICULTURAL SOCIETY'S PRIZE, at Warwick; July, 1859	50
THE KENT AGRICULTURAL SOCIETY'S PRIZE, at Ashford; August, 1859	50
THE ROYAL AGRICULTURAL SOCIETY'S PRIZE, at Canterbury; July, 1860	90
THE YORKSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Pontefract; August, 1860	50
THE ROYAL AGRICULTURAL SOCIETY'S PRIZE, at Leeds; July, 1861	100
THE ROYAL AGRICULTURAL SOCIETY'S PRIZE, at Leeds; July, 1861 (for the best set of Apparatus to be worked by ordinary Portable Engines)	75
THE NORTHAMPTONSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Northampton; September, 1861	30
THE GOLD MEDAL , at the General Meeting of the German Agriculturists and Foresters, held at Schwerin, Mecklenburg-Schwerin; August, 1861.	
THE GOLD MEDAL , at the Meeting of the Ayrshire Agricultural Society, held at Ayr; April, 1862.	
THE PRIZE MEDAL , at the International Exhibition, in London; May, 1862.	
THE NORTHAMPTONSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Stamford; July, 1862, for the best Plough	30
Do. Do. Do. Do. for the best Scarifier	30
THE SPARKENHOE AGRICULTURAL SOCIETY'S PRIZE, at Leicester; Sept., 1862	40
THE PREMIUM OF 5,000 DOLLARS, given by the Colony of BRITISH GUIANA, for the best application of Steam Power to the cultivation of the soil	1050
THE ROYAL AGRICULTURAL SOCIETY'S GOLD MEDAL AND FIRST PRIZE, at Worcester; August, 1863	30
THE ROYAL AGRICULTURAL SOCIETY'S PRIZE, at Worcester; August, 1863, for the best application of the ordinary Portable Engine	25
THE HAMBURG INTERNATIONAL AGRICULTURAL SOCIETY'S FIRST PRIZE	105
THE YORKSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Stockton; August, 1863.	50
THE YORKSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Stockton; August, 1863, for the best application of the ordinary Portable Engine	50

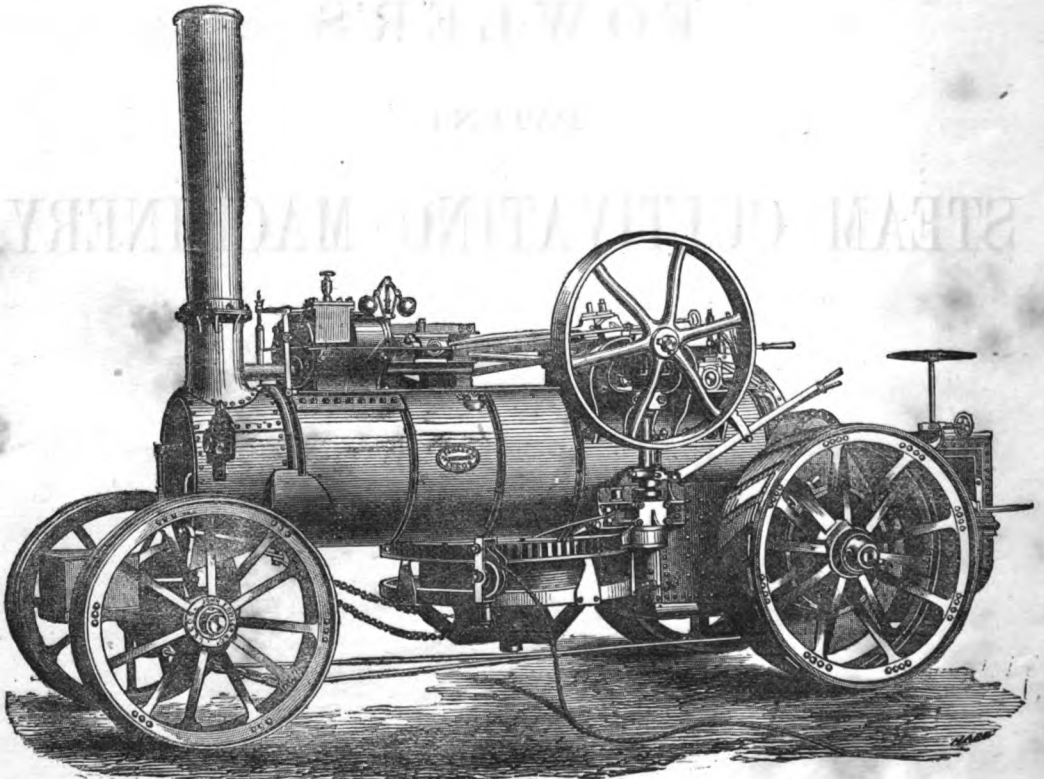
THE NORTH LINCOLNSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Boston; August, 1863, for the best system of Steam Cultivation	£.	20
THE GLOUCESTERSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Cirencester; August, 1863, for the best application of an 8-horse Power Engine.....	10	
THE NORTHAMPTONSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Kettering; September, 1863, for the best Steam Plough	20	
THE NORTHAMPTONSHIRE AGRICULTURAL SOCIETY'S PRIZE, at Kettering; September, 1863, for the best Steam Cultivator	20	
THE MANCHESTER AND LIVERPOOL AGRICULTURAL SOCIETY'S PRIZE, at Birkenhead; September, 1863.....	50	
THE BENGAL AGRICULTURAL SOCIETY'S PRIZE, at Alipore, Calcutta; January, 1864, for the best Steam Cultivating Apparatus, 500 Rupees	50	
Do. Do. for the best Double Cylinder Engine, 200 Rupees	20	
Do. Do. SILVER MEDAL , for the best Steam Plough.		
THE ROYAL AGRICULTURAL SOCIETY'S FIRST PRIZE, at Newcastle; July, 1864, for the best application of Steam Power for the Cultivation of the Soil.....	100	
Do. Do. Do. SECOND PRIZE, at Newcastle; July, 1864, for the best application of Steam Power for the Cultivation of the Soil.....	50	
Do. Do. Do. FIRST PRIZE, at Newcastle; July, 1864, for the best application of Steam Power adapted for Small Occupations	50	
Do. Do. Do. FIRST PRIZE, at Newcastle; July, 1864, for the best Steam Plough	20	
Do. Do. Do. FIRST PRIZE, at Newcastle; July, 1864, for the best Steam Cultivator	17/10	
Do. Do. Do. FIRST PRIZE, at Newcastle; July, 1864, for the best Windlass for Steam Power	15	
Do. Do. Do. FIRST PRIZE, at Newcastle; July, 1864, for the best Anchor for Steam Power	20	
THE LINCOLNSHIRE AGRICULTURAL SOCIETY'S FIRST PRIZE, at Gainsbro'. August, 1864	30	
Do. Do. Do. Do. SECOND PRIZE, at Gainsbro'.	10	
THE GOLD MEDAL as PRIZE OF HONOUR of the Pomeranian Agricultural Society, at the Universal Exhibition at Stettin; May, 1865.		
THE PRIZE OF 500 THALERS for the best Steam Plough, at Do. Do. Do.	75	
THE PRIZE OF 150 FRDKS. D'OR, at the International Exhibition at Cologne, for the Steam Plough; June, 1865	127/10	
THE PRIZE OF 500 THALERS for the best Traction Engine, Do. Do. Do.	75	
THE SILVER MEDAL AND THREE POUNDS, for an 8-horse Power set of Steam Cultivating Machinery, at the Oldham Meeting of the Manchester and Liverpool Agricultural Society; August, 1865.		
THE GOLD MEDAL, at the Meeting of the Yorkshire Agricultural Society, at Doncaster; August, 1865.		
THE GOLD MEDAL, at the French Universal Exhibition; August, 1867.		
THE SILVER MEDAL, at the Yorkshire Agricultural Society's Meeting, at Thirsk; August, 1867.		
THE LOUISIANA (U.S.) STATE FAIR PREMIUM DIPLOMA AND FIRST PRIZE, February, 1868, "for the best Traction or Locomotive Steam Engine for Farm or Plantation use, adapted to all purposes".....	\$	250
Do. Do. PREMIUM DIPLOMA AND FIRST PRIZE, "for the best practical working arrangement of Gang Ploughs, for breaking up and preparing ground for planting, to be drawn by Steam power".....		50

THE GOLD CUP , offered by his Highness the VICEROY OF EGYPT, at the Royal Agricultural Society's Meeting at Leicester; July, 1868, "for the best Implement for the Cultivation of the Soil by Steam Power, combining strength with simplicity of construction, for use in Foreign Countries, where skilled labour for repairs is difficult to be procured"			£.
Value			200
THE ROYAL AGRICULTURAL SOCIETY'S FIRST PRIZE , at Leicester; July, 1868, for the best Double Set of Steam Cultivating Apparatus.....			100
Do.	Do.	Do. SECOND PRIZE, at Leicester; July, 1868, for the best Single Set of Steam Cultivating Apparatus	25
Do.	Do.	Do. SECOND PRIZE, at Leicester; July, 1868, for the best Single Set of Steam Cultivating Apparatus (8-horse Power Engine).....	25
Do.	Do.	Do. FIRST PRIZE, at Leicester; July, 1868, for the best 4-Furrow Balance Plough	12
Do.	Do.	Do. FIRST PRIZE, at Leicester; July, 1868, for the best 7-Tine Balance Cultivator	12
Do.	Do.	Do. FIRST PRIZE, at Leicester; July, 1868, for the best Light Land Cultivator	15
Do.	Do.	Do. FIRST PRIZE, at Leicester; July, 1868, for the best Frame for Harrows, Rollers, &c.....	8
Do.	Do.	Do. FIRST PRIZE, at Leicester; July, 1868, for the best Disc-Travelling Anchor	10
Do.	Do.	Do. FIRST PRIZE, at Leicester; July, 1868, for the best Double-Drum Windlass on Engine	8
Do.	Do.	Do. FIRST PRIZE, at Leicester; July, 1868, for the best Clip-Drum Windlass on Engine.....	8
THE SILVER MEDAL , at the Yorkshire Agricultural Society's Meeting at Wetherby; August, 1868.			

C A T A L O G U E
OF
F O W L E R ' S
P A T E N T
S T E A M C U L T I V A T I N G M A C H I N E R Y .



Plan of Working.—No. 1.



14-horse power Double Cylinder Engine, with Winding Drum.

SYSTEM No. 1.

The Tackle consists of two self-moving Engines with winding drums, 800 yards of hard steel rope, and ten rope porters.

PLAN OF WORKING. (*See Engraving.*)

Two Winding Engines are worked on opposite headlands, and each alternately draws the implement towards itself, the Engine not in work paying out the rope while moving forward into position for the return bout. Any kind of implement may be used.

One of the principal advantages of this system is the facility with which the machine is set to work, and taken up. The Engines are ready to start into a fresh field the moment they have stopped work, and remove themselves and the whole of the apparatus without any additional manual or animal labour. Where fields are small or very irregular, or where, as frequently in foreign countries, the steam plough cannot depend on any prompt assistance for removals; or where the distance of fields and farms which have to be worked is considerable, this handiness for moving about is evidently of great importance.

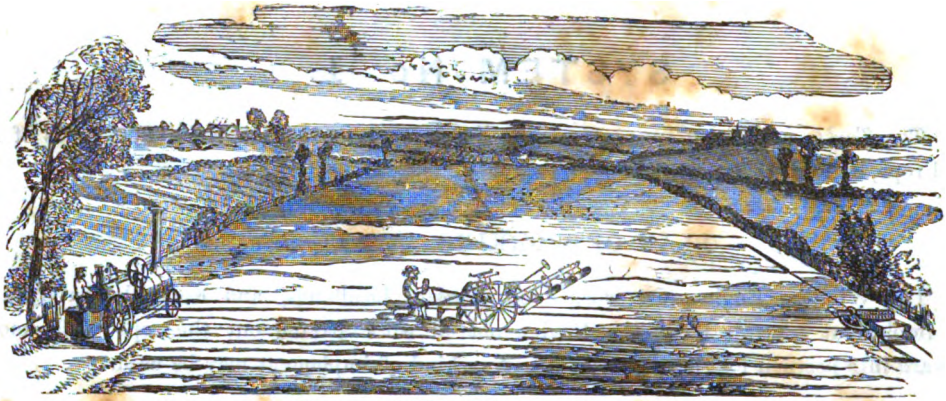
A further advantage of this System is the possibility of using implements of large size which could not be moved from field to field by any apparatus not self-moving. For the cultivation of light land, which in an economical point of view is only practicable by employing implements of the greatest possible breadth, this System is invaluable. The fact that it will do from 30 to 50 acres regular work per day, on the lighter class of soils, at once establishes its superiority over any other class of machinery for that purpose.

Self-moving Engine, with Winding Drum.

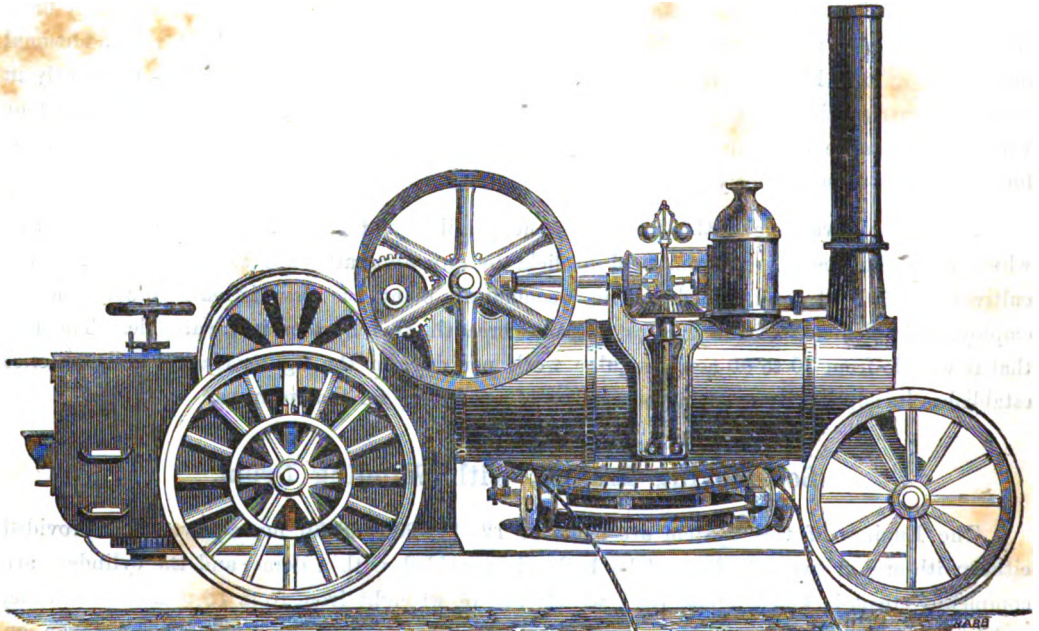
The Engines of this System are made of 12, 14, 20, and 30 horse-power, and provided either with one or two cylinders. The boiler is provided with a dome, and the cylinders are completely steam-jacketed. The road wheels are of wrought iron, from 18 to 24 inches wide, and at a small cost this width can be increased so as to admit of the Engine being taken on very soft land. The road-gear, composed exclusively of spur wheels, gives to the Engine two different travelling speeds, the Engine being thus available at a moment's notice as a common Traction Engine or an ordinary Portable, and as such specially adapted for thrashing, pumping, grinding, sawing, and any other operation of the kind.

The power is conveyed to the windlass by an upright shaft from the crank-shaft. The winding apparatus consists of a horizontal drum, which, by means of our patent coiling gear, winds and unwinds the wire rope uniformly without any attention from the man in charge. This is done by a self-acting lever, which carries two vertical guide pulleys, moving slowly up and down, and freely swinging round the drum into any position at which the rope has to work. Thus all undue strain on the rope, as well as on the apparatus, is completely avoided.

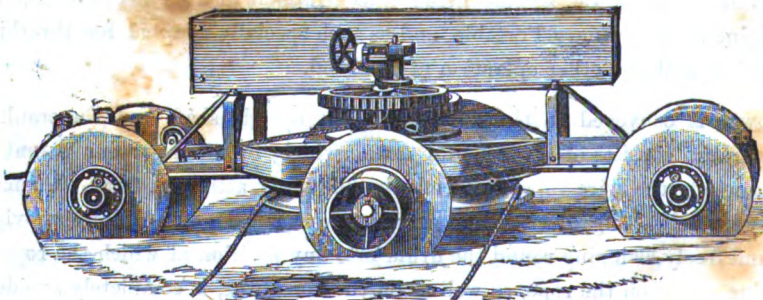
Particulars of implements to work with this tackle will be found on pages, 8 to 23.



Plan of Working.—No. 2.



12-horse power Single Cylinder Engine, with Clip Drum.



Patent Anchor.

SYSTEM No. 2.

The Tackle consists of self-moving Engine with clip-drum windlass, anchor, 800 yards of hard steel wire rope, twenty rope porters or carriers, and snatch block with headland rope for pulling the anchor forward.

PLAN OF WORKING. (*See Engraving.*)

On the left headland is the engine, and directly opposite to it the anchor. Both move gradually forward along the headlands, and between them the plough or other implement is pulled backward and forward: one end of it being alternately in the air, and the other in the ground, thus avoiding the necessity for turning. The implements are constructed with patent slack gear, which lengthens or shortens the ropes as the boundary of the field may require, and at the same time, without any loss of power, keeps both ropes sufficiently tight to prevent them from trailing on the ground (if properly "portered"). Any class of implement may be used that can be fitted with "slack gear."

Self-moving Engine and Patent Clip-drum Windlass.

This Engine is in every respect similar to the one described on page 11, except with regard to the winding apparatus. The Windlass consists of a single sheave 5 feet in diameter round which the rope takes *half* a turn: the groove into which the rope passes is formed of a double series of small clips, which on the least pressure clasp and hold the rope until it takes the straight line on the other side, when they freely open and liberate it. By this simple appliance all crushing and short bends, which are so detrimental to the profitable use of wire rope, are entirely avoided: the rope being only bent twice on each passage of the implement, and then round large diameters. The clips are made of chilled cast iron, which is not liable to much wear, but when worn can be replaced at a trifling cost.

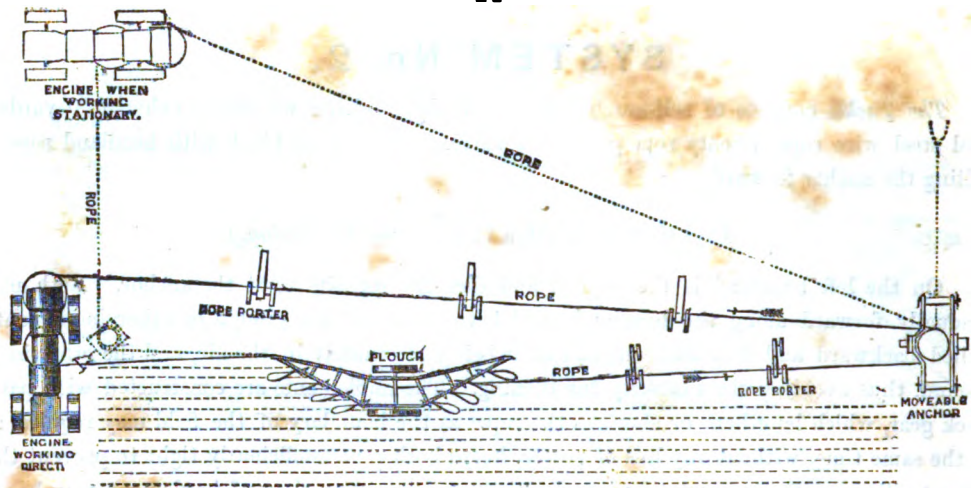
Clip-drum engines for this system are made of 12 and 14-horse power: they can at any time be used for Traction purposes, and are also specially adapted for thrashing, pumping, sawing, or any other work for which Portable Engines are suitable.

Patent Anchor.

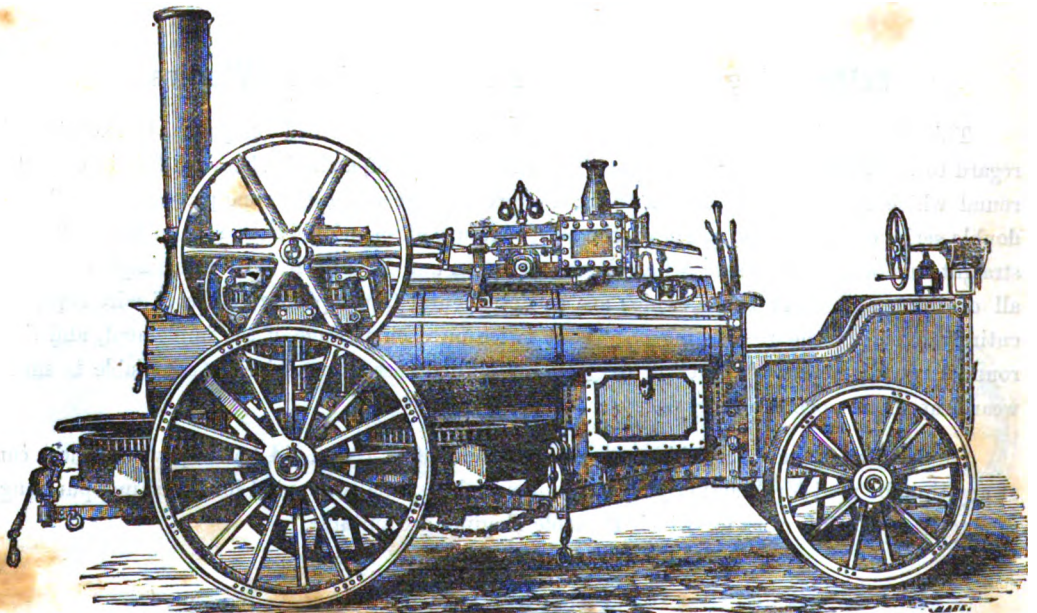
This is made with thin disc wheels, which cut into the ground, and resist the side strain of the engine and implement. It is moved along the headland by the motion of the sheave or pulley, which is turned by the rope: the sheave is connected by gear to a drum, which winds up a rope stretched along the headland, thus keeping the anchor opposite its work. The frame is made entirely of wrought iron. The machine is provided with a steerage, which enables it to be worked along a crooked headland; and it is managed by a boy, who also attends to shifting rope porters. The box at the back is intended as a counterpoise to prevent the anchor from being pulled over when doing very heavy work.

Particulars of Implements to work with this Tackle will be found on pages 18 to 23.

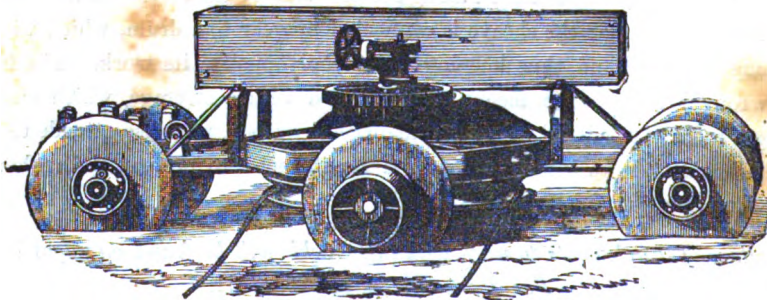
For Prices, see pages 29 to 31.



Plan of Working.—No. 3.



12-horse power Engine, with Two Winding Drums.



Patent Anchor.

SYSTEM No. 3.

The Tackle consists of an 8 or 12-horse power double-drum Engine, anchor, 1,600 yards of rope (1,200 only being required when working direct), two claw anchors, two snatch blocks, and twenty rope porters.

PLAN OF WORKING (*See Engraving*).

The Engine is constructed either to work along the headland with an anchor, &c., having a direct pull upon the implement, as in System No. 2, or to stand in a corner of the field and work the Tackle with the addition of the snatch-blocks: thus avoiding the necessity of travelling the Engine along the headland when circumstances, such as very hilly ground, irregular fences, or a wet condition of the soil, make it desirable that the Engine should not be taken upon the land. The engraving shows the Tackle working both ways, the black lines indicating its position when working direct, and the dotted lines when working with the Engine stationary

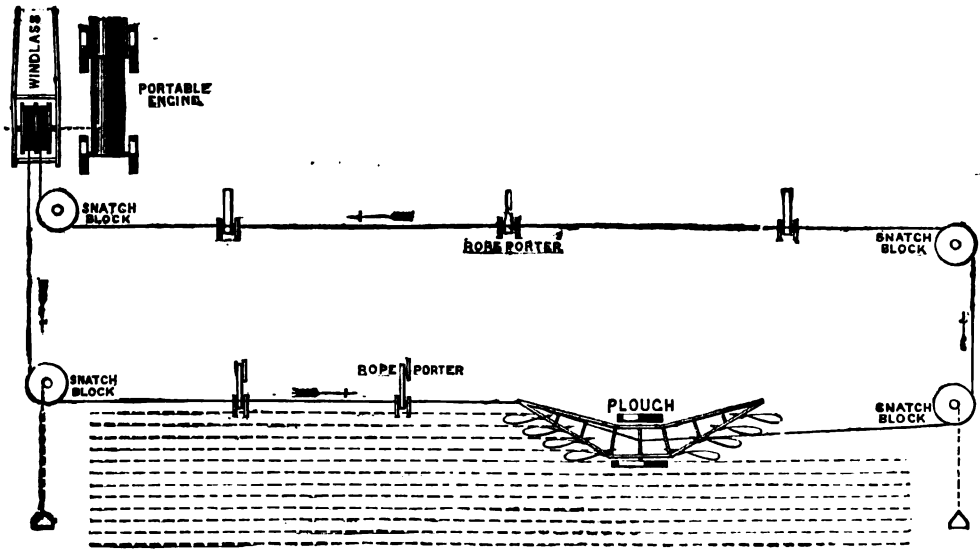
Where the amount of capital required for the purchase of System No. 1 is not available we particularly recommend this arrangement, as offering to the farmer the benefits of two systems, and enabling him to meet successfully most of the difficulties he has to contend with in Steam Cultivation.

Double-Drum Winding Engine.

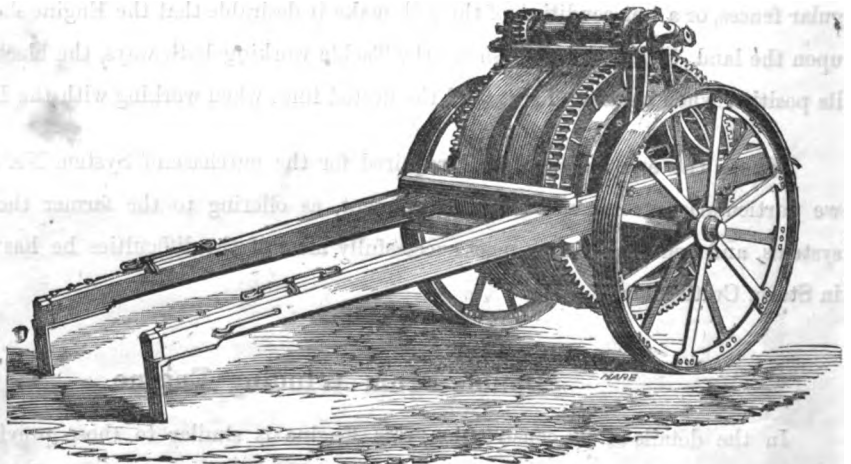
In the details of its construction, this Engine is similar to those previously named, the chief point of difference being that it is fitted with two winding drums, each having coiling gear the same as that described on page 11, arranged so that the rope can pass on to the drums at almost any angle. Engines of this class are made of 8 and 12-horse power.

Patent Anchor.

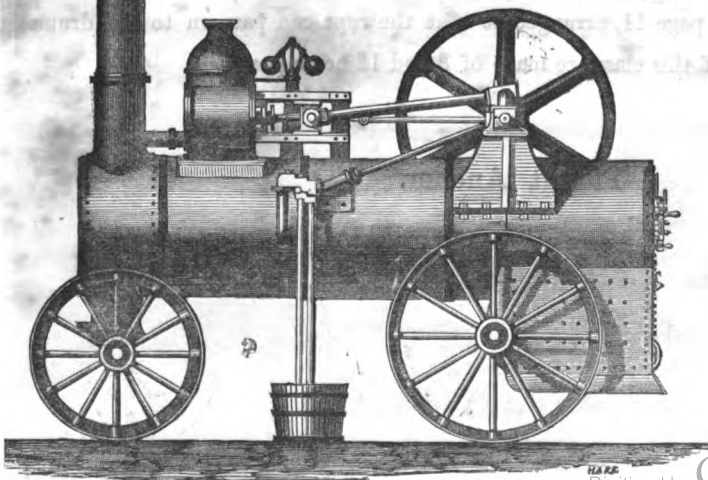
For description, see page 13.



Plan of Working.—No. 4.



Windlass.



Portable Engine.

SYSTEM No. 4.

The Tackle consists of a detached winding windlass, seven snatch-blocks and claw anchors, 1,600 yards of rope, twenty-one rope porters, levers, crowbars, &c., &c. A *combined* plough and cultivator is also made for this Tackle, and included in the price.

PLAN OF WORKING

Is fully explained by the engraving.

This is a small priced Tackle, arranged to be worked by any ordinary Portable Engine. We recommend it only under certain circumstances, where the purchase of the more powerful and comprehensive systems is out of the question, or where existing portable engines have to be utilised. The cost of this Tackle is only £250.

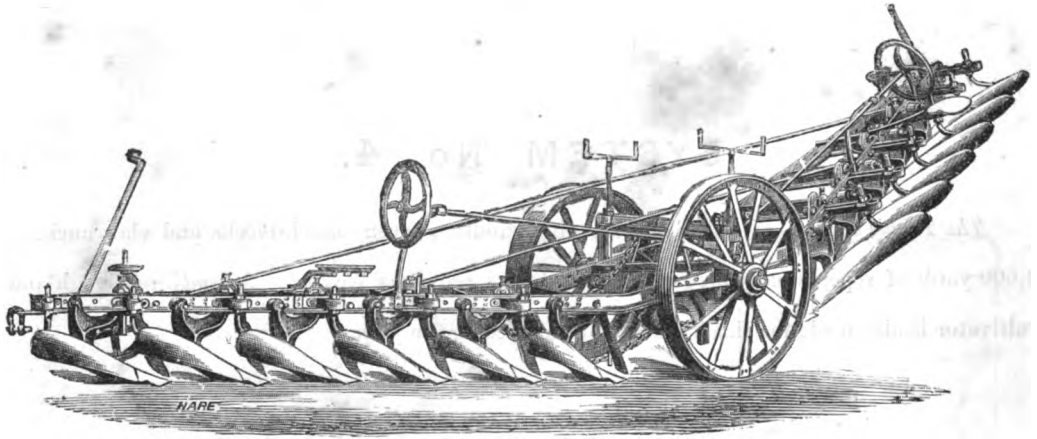
The Windlass is shown on the opposite page.

Portable Engine,

SUITABLE FOR WORKING THE ABOVE-NAMED TACKLE.

In this Engine, as well as in all our other Steam Engines, the cylinder is combined with a dome, so arranged as entirely to surround it by steam, which is taken from the quietest position in the boiler. By this means the steam is used in the driest state, consequently a great saving in fuel and water is the result. That this end is really attained was fully proved by the Steam Ploughing Trials at the Meeting of the Royal Agricultural Society at Newcastle. Access is very easily gained to the different parts of the Engine, and they may be removed and replaced by any ordinary labourer. A complete set of firing tools, &c., is sent out with each Engine.

For Prices, see page 30.



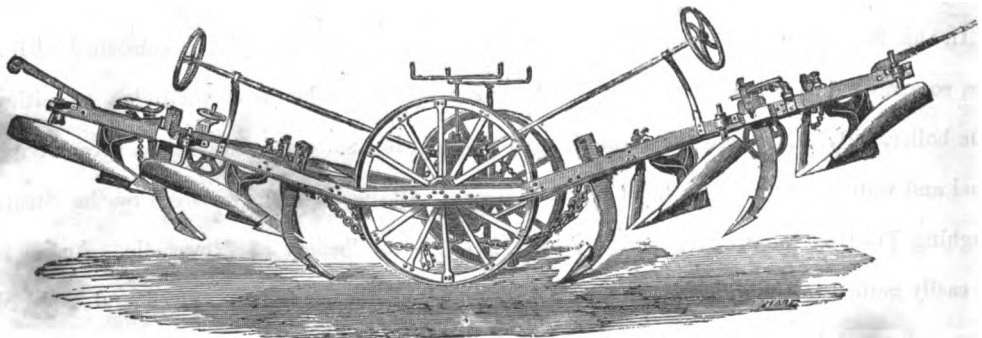
Patent Balance Plough.

The above engraving represents a Balance Plough and Cultivating Machine, made of iron, and adjustable to different widths of furrow. The plough skifes and coulter are fixed on a bevel beam, and by altering their positions along the beam in either direction a wider or narrower furrow is cut at pleasure, retaining at the same time the rigidity of a riveted frame which is so essential to the durability of a steam-going implement. Several operations can be performed by this implement without much alteration being made.

By removing the ordinary mouldboards used for surface ploughing, and substituting short ones or "Digging Breasts," a tillage can be effected quite equal, if not superior, to Spade Husbandry, which leaves the land in the most desirable state for the action of the atmosphere.

From the shares and mouldboards being attached on the outside of the beam, all choking in very foul land is obviated. A harrow can be attached and drawn behind the Plough, if desired by the Farmer.

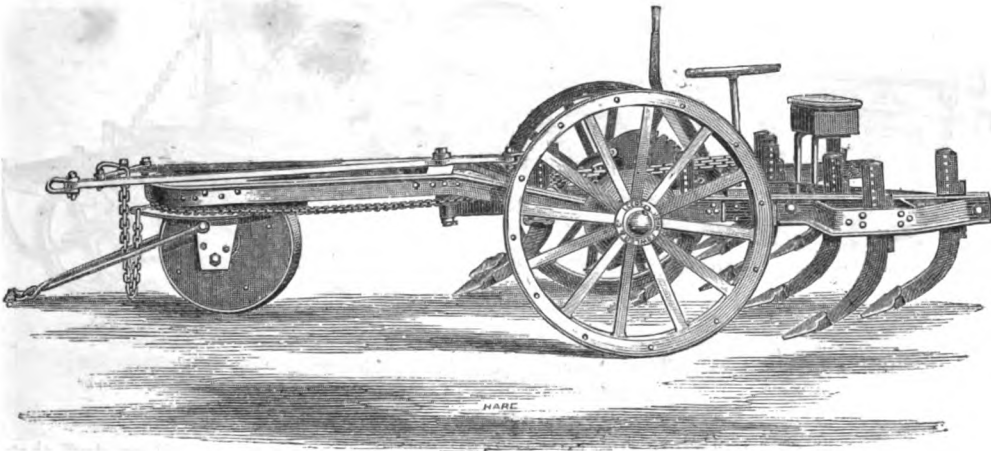
Ploughs can be supplied to turn two, three, four, six, or eight furrows, as circumstances may require.



Patent Subsoil Plough.

The above implement is constructed and worked on the principle of a Balance Plough. Besides the ordinary ploughs attached to it, it is fitted with tines, one tine following each plough and breaking up the subsoil to any required depth without throwing it on the top of the land. In some land it is simply ruinous to bring up the subsoil at once to the surface; but by admitting the atmosphere to it, it may gradually be prepared for this operation.

For Prices, see page 30.

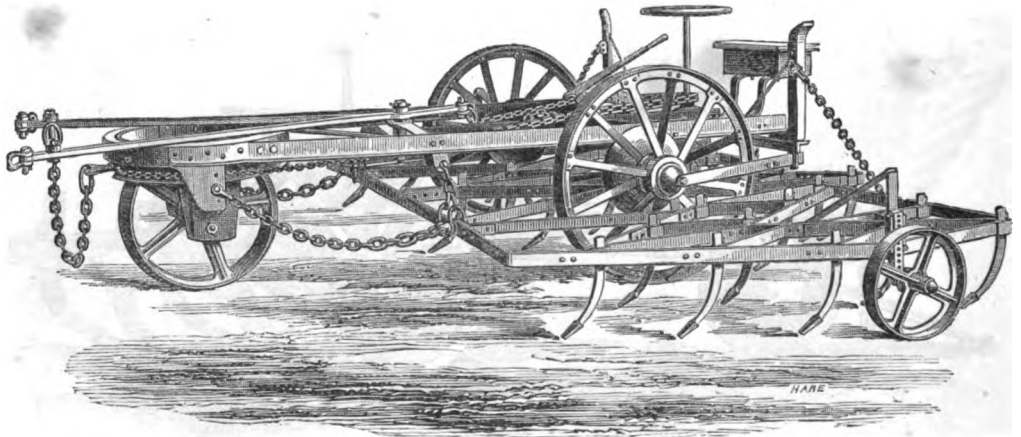


Patent Turning Cultivator.

This implement is specially adapted to be worked by the Double Engine Tackles. It consists of a strong iron frame, carrying according to circumstances from 5 to 13 tines, and resting on three roadwheels, the front wheel being the steering wheel. The axle of the two hind wheels is cranked, so that, by its being turned the frame is lowered or raised, and by these means the depth of the tines adjusted. The long end of a draft bar, or "patent turning lever," is provided with two arms to which the ropes of the two engines are attached. The arms are set at an angle, for keeping the tail rope clear of the implement. The lever itself is held by a vertical stud fixed to the frame, considerably behind the steering wheel. This position of the draft-stud, the object of a special and important patent, gives the necessary liberty and power to the steering wheel, and enables it to lead the implement at almost any angle out of the line of the pulling rope. On the short end of the turning lever is a chain communicating with a quadrant on the crank axle, and as the lever is pulled round the chain acting on the quadrant turns the axle, lifts the frame, and raises the tines out of the ground. The plan of operation is as follows:—As soon as the Cultivator is brought up to the headland, the Engine on the opposite headland begins to work, and pulling the lever round, lifts the tines out of the ground, which are held up by a catch; when lifted the required height, the lever strikes against a stop and pulls the implement round into new ground; the man (who never leaves his seat) releases the catch, the tines drop into the ground, and the implement is drawn across the field.

The principal advantages of this excellent implement are as follows:—Its size is only limited by the power of the engines, which thus may be used to their utmost capability. It smashes up the soil, working steadily, and always preserving a perfectly uniform depth. Even the largest implements of this description require only one man in attendance. In turning round, no additional work whatever is required, and scarcely any time is lost, whilst the implement, however wide, at once moves into new land, leaving small and clean headlands. On average soil 30 to 50 acres per day may be efficiently cultivated. Ridging bodies attached to the frame of this cultivator will produce a most effective and easily-handled ridging implement.

For Prices, see page 30.



Turning Harrow.

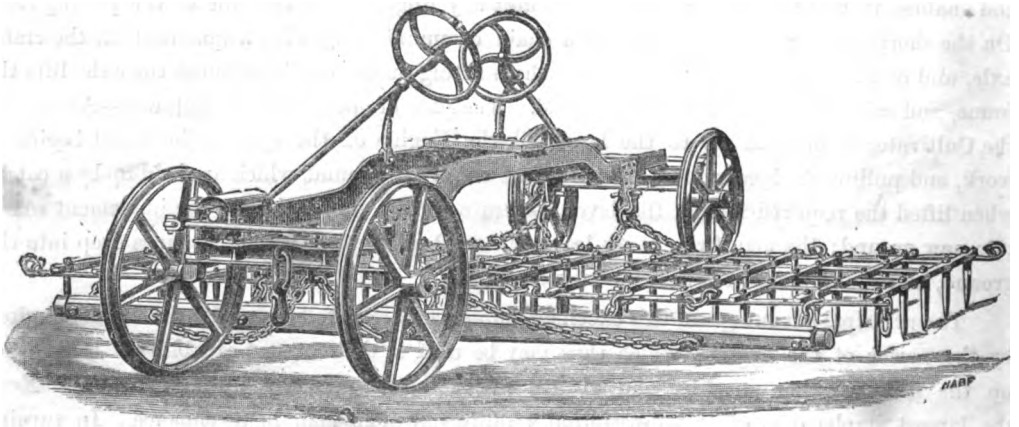
The difficulty occasioned by the ordinary Cultivator turning up more callous stuff than is desirable in the spring of the year, is entirely obviated by the adoption of this Implement, which, it will be seen, is a combination of Cultivator and Harrow, and is adapted for doing work which may be described as halfway between that effected by a Cultivator and Harrow.

The Shares are of cast-iron, are renewable, and can be made any width, so as to cut nearly all the ground.

This Implement is constructed in three pieces, so as to accommodate itself to uneven surfaces; its total width is 15 feet; it is specially designed and adapted to work in land which has been steam-ploughed, dug, or cultivated in the previous autumn, and it will do everything necessary in the spring to ensure the land being in a proper state for any kind of crop. The steering-frame is so arranged that it will take different harrows, from the lightest seed harrow up to regular light cultivating tools. It also can be fitted with light ridging ploughs. In a similar way to the action of the Cultivator previously described, it is lifted at the end and turned round, thus getting into new work at once.

This exceedingly useful Implement is made of wrought-iron, with welded sockets for the tines.

For Prices, see page 30.

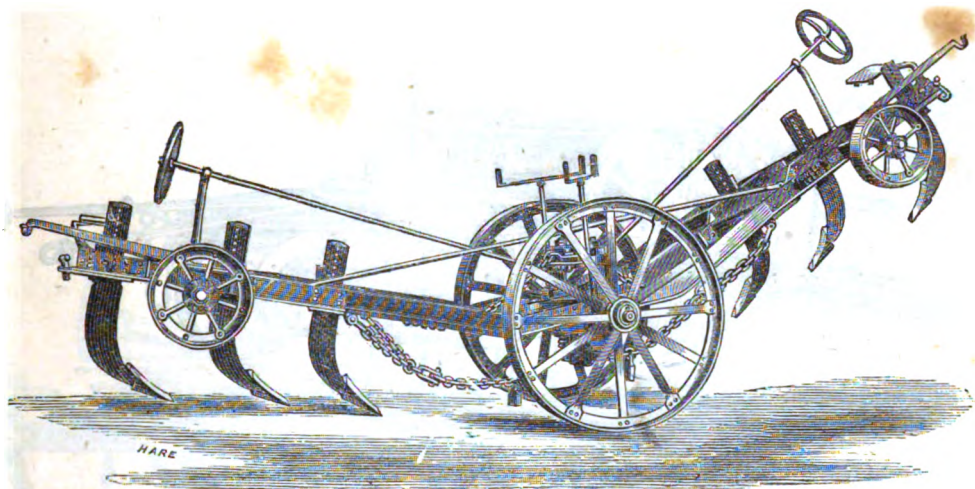


Ordinary Steam Harrow.

This implement will take a breadth of from 15 to 18 feet, and thus from 40 to 60 acres can be easily gone over in a day. This operation is all that is necessary for spring cultivation when land has been thrown up roughly by the "digging breasts" in the previous autumn.

The harrow is very strongly constructed, can be driven at a high speed, and the tines will be found to penetrate the soil to a great depth. The harrow under-frames can be removed, and rollers, clod crushers, Norwegian harrows, or any other implements, substituted for them.

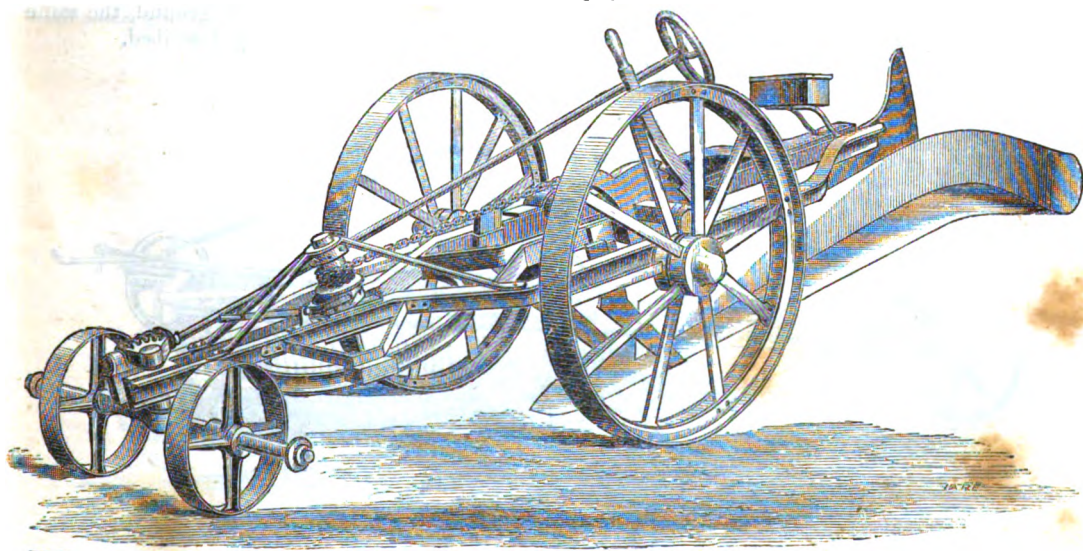
For Prices, see page 30.



Extra Strong Grubber or Knifer.

Frequently—especially in foreign countries—stones, roots, or other natural impediments have to be removed before employing the usual implements for steam cultivation. For this purpose the above implement is particularly adapted. It is worked similarly to the Balance Plough, carrying three tines only of great strength, which may be made to penetrate the soil to a very considerable depth. In heavy clay lands, where it is not advisable to bring the subsoil to the top, the tines of this implement may be driven through the ground at a depth of from 2 feet 6 inches to 3 feet, without materially disturbing the surface. This operation greatly facilitates the drainage as well as aeration of the ground, and materially improves its character.

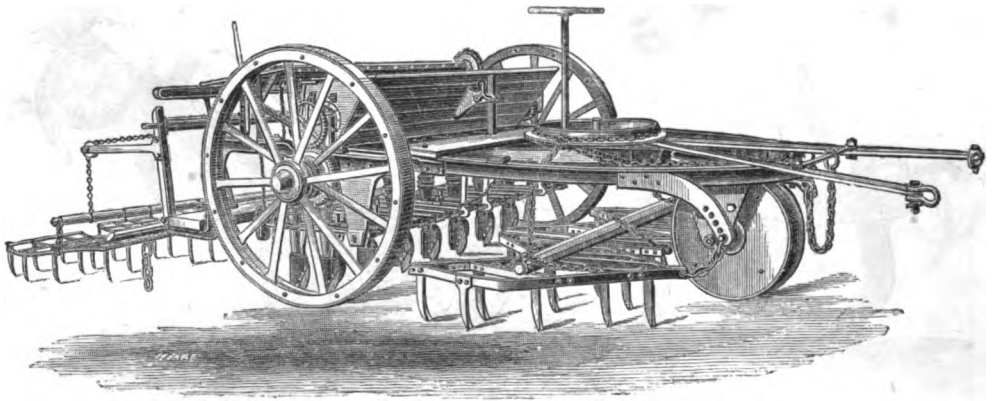
For Prices, see page 30.



Ditching Machine.

This machine, specially constructed for opening wide drainage or irrigation ditches, may, by means of blocks, be worked by ordinary Winding Drum Engines, or direct by the engine described on page 26. For the special requirements of Sugar and Cotton cultivation in foreign countries it will be found exceedingly useful.

For Prices, see page 30.



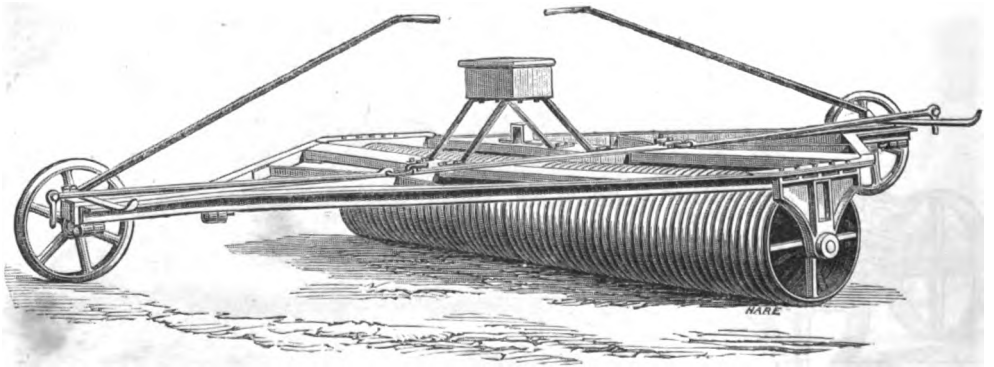
Steam Drill.

The great drawback to Steam Drilling, hitherto experienced, has been that a drill of even the largest width, admissible under ordinary circumstances, requires only a fraction of the power which is at the disposal of the engines generally supplied for cultivating operations. Only by combining other operations, such as light-cultivating and harrowing with the drilling, can the power be fully and advantageously applied.

For this reason, our Drill is combined with a light cultivator or heavy harrow in front of the seed coulters, and a light seed harrow following the same. Thus three distinct operations are performed in going over the land once.

The Drill has a total width of 9 feet. In turning round the heavy harrows are lifted by the power of the engine, and the whole implement moves at once on new ground, the same mechanical principles being applied as in our Turning Cultivators, previously described.

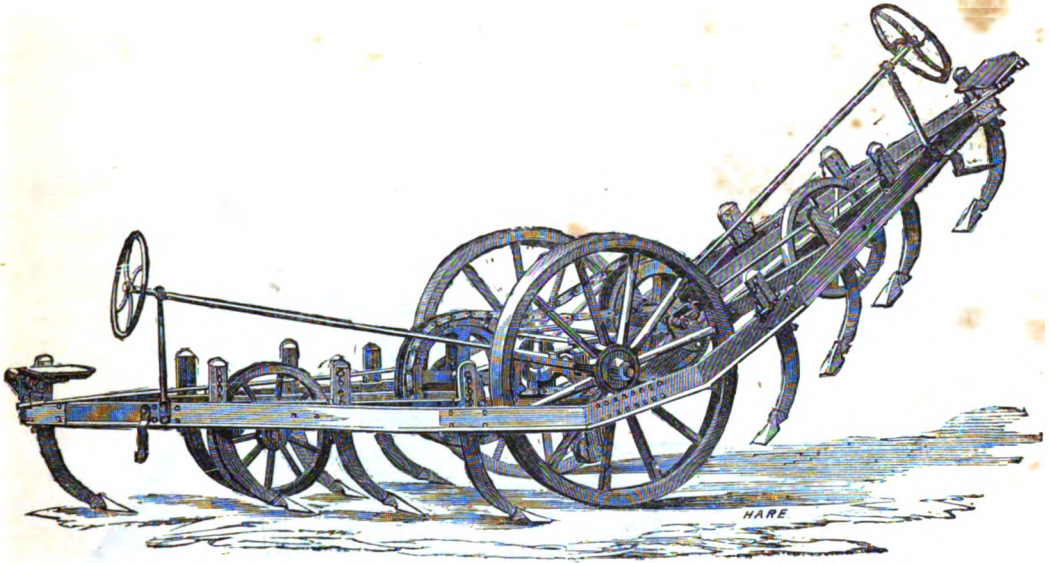
For Prices, see page 30.



Steam Roller.

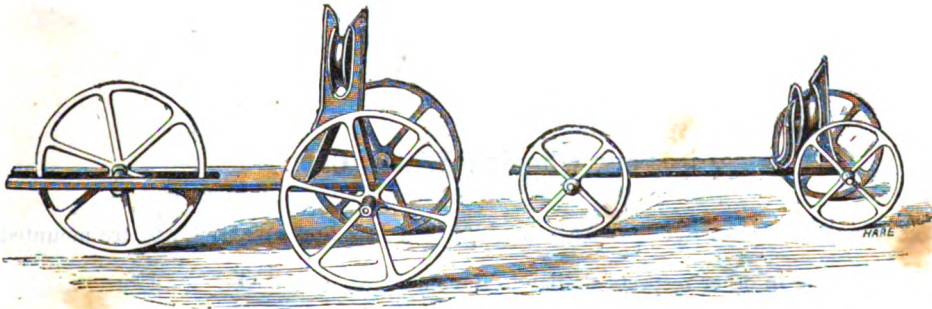
This machine, taking a total width of 15 feet, may be fitted with any description of rollers. The frame is hinged in the middle, and can readily be taken to pieces, so that in moving from field to field the two halves are pulled one behind the other; any difficulty in moving this broad implement about being thus effectually overcome.

For Prices, see page 30.



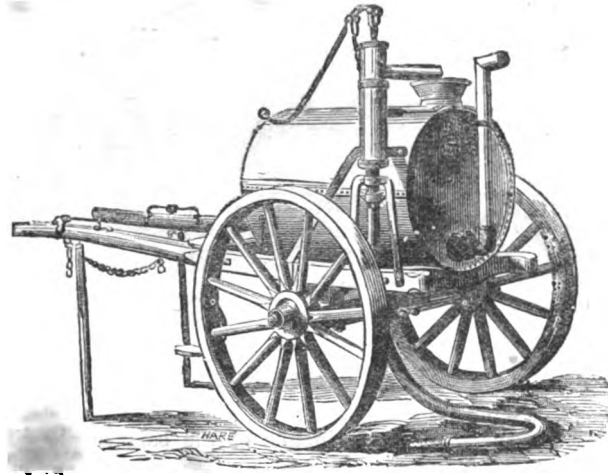
Patent Balance Cultivator..

This Cultivator is constructed on the principle of the balance ploughs, the frame being provided with cultivator tines, instead of plough bodies. It is specially adapted to be worked by our system No. 2 (for which the Turning Cultivator is not available), and is therefore fitted with slack gear. Cultivators of this description are fitted with 5 to 9 tines as may be required.



Rope Porters.

These Porters are placed along the line of the rope at intervals of 40 yards, thereby keeping it entirely off the ground. They are mounted on three wheels, so as to allow them to be moved sideways by the rope.



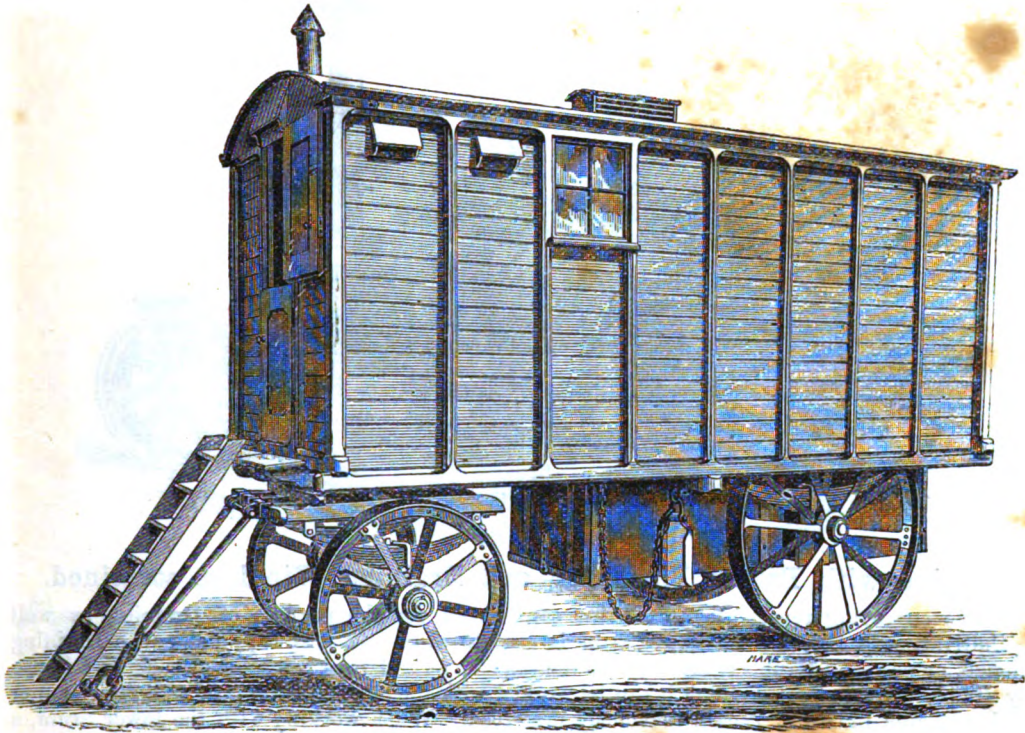
Two-wheeled Water Cart.

This Water Cart is constructed high enough to allow the water to run out of it into the Engine tank or water drill, and will be found a very necessary appendage to a set of Tackle. A pump is attached with gutta-percha tube, to draw water from any pond, &c.

Four-wheeled Water Cart.

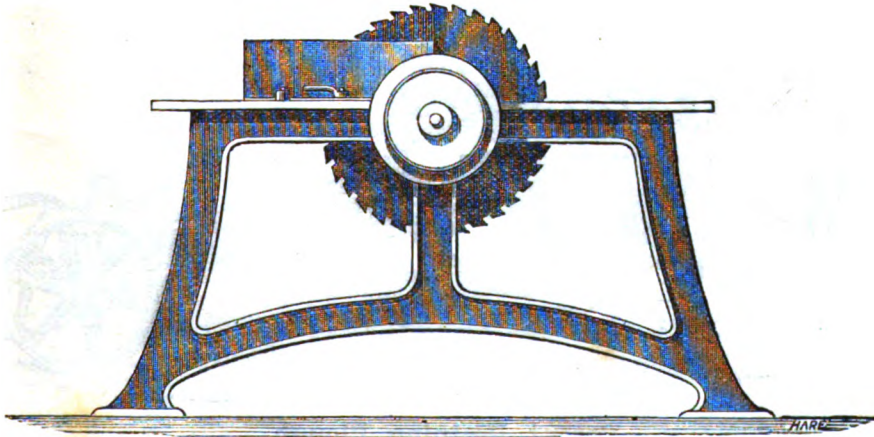
For countries where double harness and poles are used our Water Carts are mounted on four wheels, being in other respects similar to the one above described.

For Prices, see page 30.



Sleeping Van.

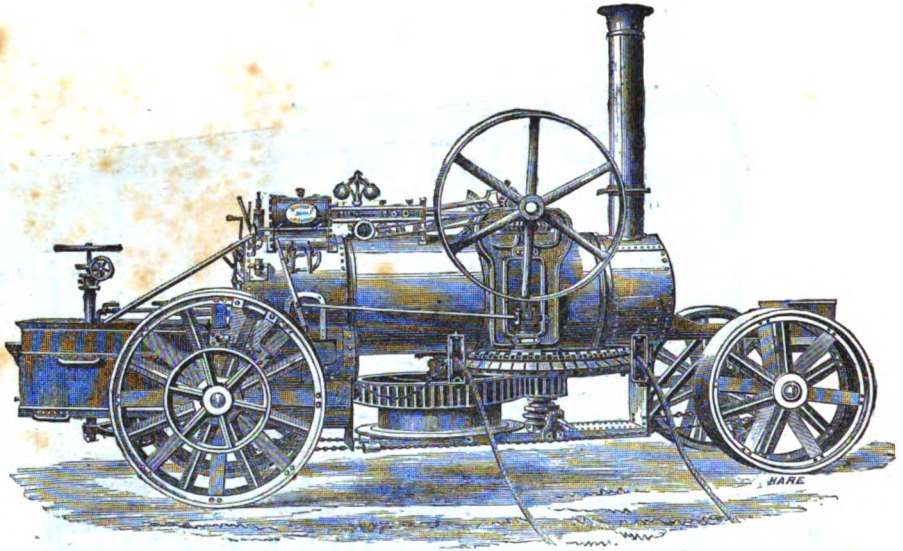
This Van is mounted on springs, with four wrought iron wheels, and is sufficiently strong to carry five or six tons. It has a large space for containing all necessary duplicate parts, and is fitted with vice bench, &c., separate sleeping berths, and a stove for cooking. It will be found a most useful appendage to a letting-out set of Tackle. Price, £85.



Circular Saw Bench.

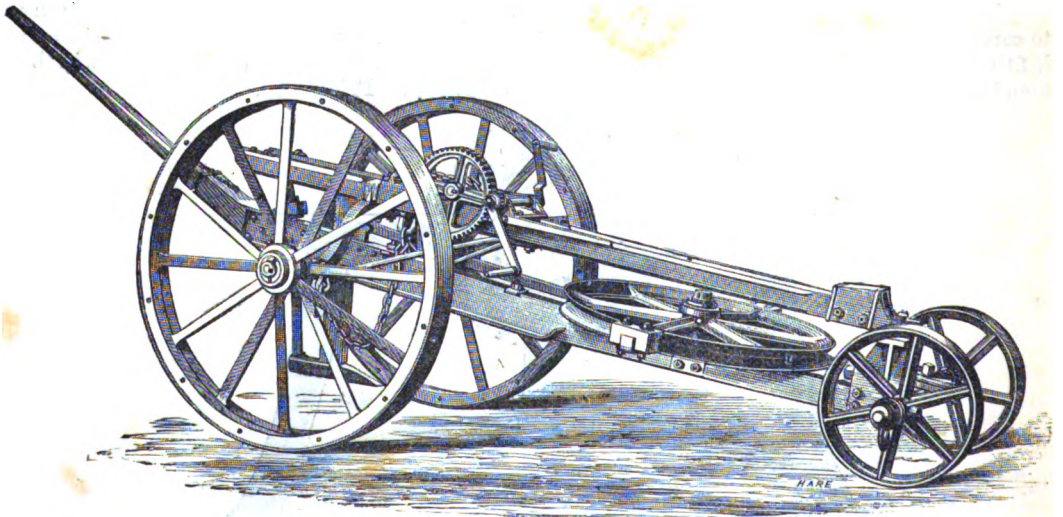
The engraving represents a Circular Saw Bench for preparing wood for fuel. It is also suitable for general sawing purposes, being fitted with a parallel moving fence, which is adjustable to various widths, thus ensuring a perfectly straight cut. The frame, which is of cast iron, is so constructed as to be quite rigid; and, having very broad feet, can be fixed for work with very little trouble.

For Prices, see page 30.



Engine with Patent Ploughing and Draining Windlass combined.

The engraving represents an Engine constructed for the purpose of Draining as well as Cultivating by Steam. The lower drum is used to wind up a wire rope and pull a Draining Plough, or powerful Grubber, towards it; the implement and rope being taken back by a horse. By simply throwing out a clutch it can be worked with the clip-drum alone in a similar manner to the Engine in No. 2 Tackle previously described. When working with the lower drum, a strain of from seven to ten tons can be exerted on the implement.

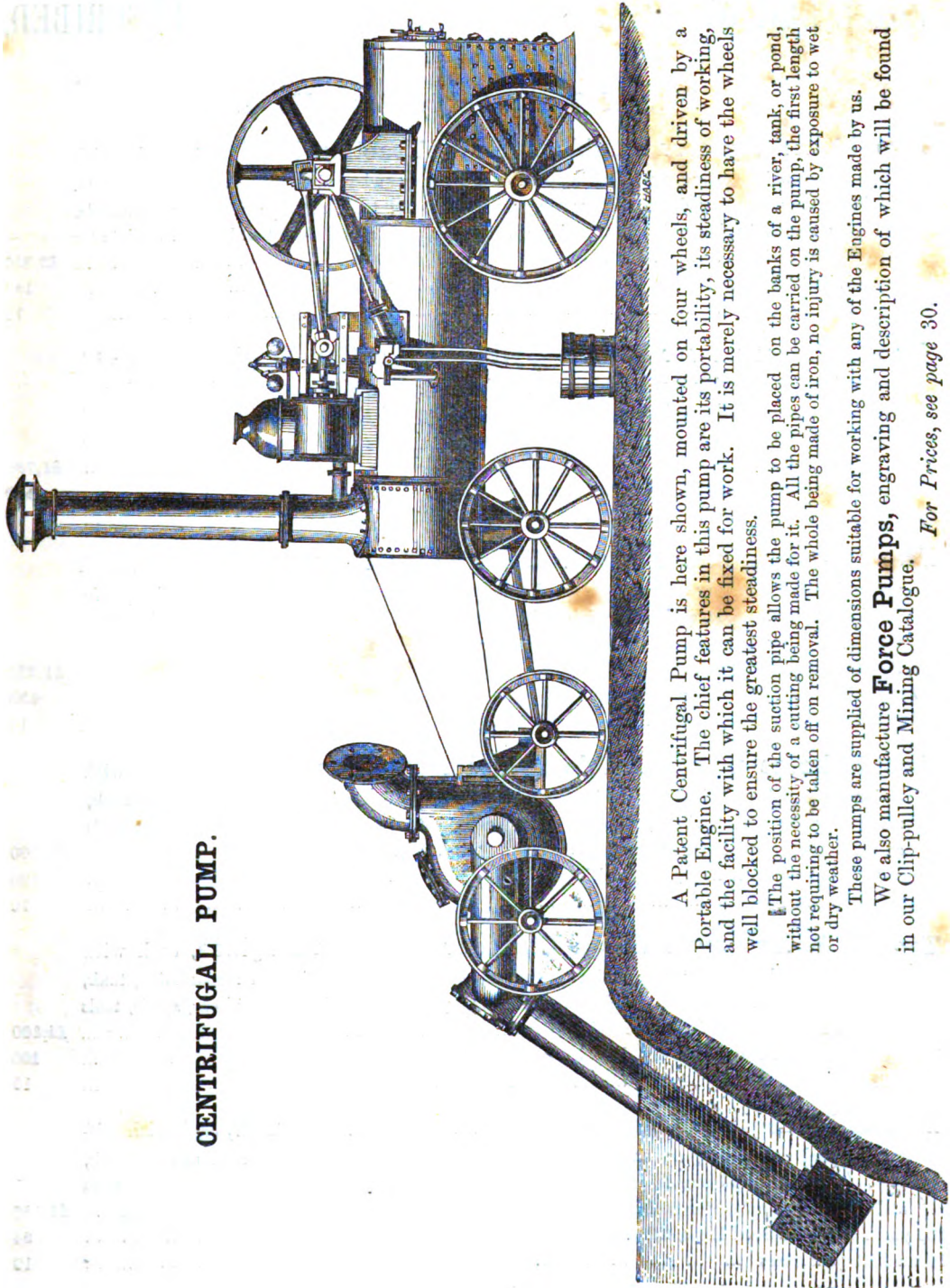


Patent Draining Plough.

This machine is adapted to be worked by the ordinary Ploughing Engine. It may be used as a Mole Plough, or to put in pipes, and can be safely worked to a depth of three feet six inches in clay soils. This gained the Royal Agricultural Society's Medal at Exeter in 1850, at Gloucester in 1853, and at Lincoln in 1854, where it was first worked by steam power. The work done by it is still giving entire satisfaction.

For Prices, see page 30.

CENTRIFUGAL PUMP.



A Patent Centrifugal Pump is here shown, mounted on four wheels, and driven by a Portable Engine. The chief features in this pump are its portability, its steadiness of working, and the facility with which it can be fixed for work. It is merely necessary to have the wheels well blocked to ensure the greatest steadiness.

The position of the suction pipe allows the pump to be placed on the banks of a river, tank, or pond, without the necessity of a cutting being made for it. All the pipes can be carried on the pump, the first length not requiring to be taken off on removal. The whole being made of iron, no injury is caused by exposure to wet or dry weather.

These pumps are supplied of dimensions suitable for working with any of the Engines made by us.

We also manufacture **Force Pumps**, engraving and description of which will be found in our Clip-pulley and Mining Catalogue.

For Prices, see page 30.

PRICE LIST OF THE MACHINERY PREVIOUSLY DESCRIBED.

Plan of Steam Cultivation.—No. 1.

Two 30-horse power Double Cylinder Traction Engines, each with self-moving and reversing gear, double speed on ploughing and road motion; all main brackets, brakes, shafts, winding drum, and gearing made of steel; tank, steerage, 24-inch road wheels, winding drums having patent self-acting coiling gear, spuds, tools and tool boxes, complete for Steam Cultivation **£2,330**

1,000 yards best hard Steel Rope, fitted with eyes **150**

10 large Rope Porters **15**

Two 20-horse power Double Cylinder Traction Engines, each with self-acting and reversing gear, double speed on ploughing and road motions; all shafts, hind axle, bracket on driving side, and all gearing liable to breakage, of steel; tank, steerage, 20-inch road wheels, winding drum having patent self-acting coiling gear, spuds, tools and tool box, complete for Steam Cultivation **£1,730**

800 yards best hard Steel Rope, fitted with eyes **150** *£120*

10 large Rope Porters **15**

Two 20-horse power Single Cylinder Traction Engines, each with self-acting and reversing gear, double speed on ploughing and road motions; all shafts, hind axle, bracket on driving side, and all gearing liable to breakage, of steel; tank, steerage, 20-inch road wheels, winding drum, having patent self-acting coiling gear, spuds, tools and tool box, complete for Steam Cultivation **£1,730**

800 yards best hard Steel Rope, fitted with eyes **150** *£120*

10 large Rope Porters **15**

Two 14-horse power Double Cylinder Traction Engines, each with self-moving and reversing gear, and with double speed and steel gearing on road motion, tank, steerage, 20-inch road wheels, winding drum having patent self-acting coiling gear, spuds, tools and tool box, complete for Steam Cultivation **£1,300**

800 yards best hard Steel Rope, fitted with eyes **100**

10 small Rope Porters **10**

Two 14-horse power Single Cylinder Traction Engines, each with self-moving and reversing gear, and with double speed and steel gearing on road motion, tank, steerage, 20-inch road wheels, winding drum having patent self-acting coiling gear, spuds, tools and tool box, complete for Steam Cultivation **£1,300**

800 yards best hard Steel Rope, fitted with eyes **100**

10 small Rope Porters **10**

Two 12-horse power Single Cylinder Traction Engines, each with self-moving and reversing gear, and with double speed and steel gearing on road motion, tank, steerage, 20-inch road wheels, winding drum having patent self-acting coiling gear, spuds, tools and tool box, complete for Steam Cultivation **£1,180**

800 yards best hard Steel Rope, fitted with eyes **84**

10 small Rope Porters **10**

For Prices of Implements, see page 30.

Plan of Steam Cultivation, No. 2.

14-horse power Double Cylinder Traction Engine , with self-moving and reversing gear, and with double speed and steel gearing on road motion, tank, steerage, 20-inch road wheels, clip-drum, spuds, tools, and tool box, complete for Steam Cultivation	£650
Self-moving Anchor, with 6 discs, lifting jack, headland ropes, and all tools complete	55
800 yards best hard Steel Rope, fitted with eyes	84
10 large Rope Porters }	25
10 small do. do. }	

14-horse power Single Cylinder Traction Engine , with self-moving and reversing gear, and with double speed and steel gearing on road motion, tank, steerage, 20-inch road wheels, clip-drum, spuds, tools and tool box, complete for Steam Cultivation	£650
Self-moving Anchor, with six discs, lifting jack, headland ropes, and all tools complete	55
800 yards best hard Steel Rope, fitted with eyes	84
10 large Rope Porters }	25
10 small do. do. }	

12-horse power Single Cylinder Traction Engine , with self-moving and reversing gear, and with double speed and steel gearing on road motion, tank, steerage, 20-inch road wheels, clip-drum, spuds, tools and tool box, complete for Steam Cultivation	£590
Self-moving Anchor, with 6 discs, lifting jack, headland ropes, and all tools complete	55
800 yards best hard Steel Rope, fitted with eyes	84
10 large Rope Porters }	25
10 small do. do. }	

For Prices of Implements, see page 30.

Plan of Steam Cultivation.—No. 3.

12-horse power Single Cylinder Traction Engine , with self-moving and reversing gear, and with double speed and steel gearing on road motion, tank, steerage, two winding drums having patent self-acting coiling gear, spuds, tools and tool boxes, complete for Steam Cultivation	£620
Self-moving Anchor, with 6 discs, lifting jack, headland ropes, and all tools complete	55
1,200 yards best hard Steel Rope, fitted with eyes	118
10 large and 10 small Rope Porters	25
Extra parts and rope required when working with Engine stationary... .. .	50

8-horse power Single Cylinder Traction Engine , with self-moving and reversing gear, and with double speed and steel gearing on road motion, tank, steerage, two winding drums having patent self-acting coiling gear, spuds, tools and tool boxes, complete for Steam Cultivation	£490
Self-moving Anchor, with 6 discs, lifting jack, headland ropes, and all tools complete	45
1,200 yards best hard Steel Rope, fitted with eyes	60
10 large and 10 small Rope Porters	12
Extra parts and rope required when working with Engine stationary... .. .	50

For Prices of Implements, see page 30.

Plan of Steam Cultivation.—No. 4.

Patent Windlass, with Compensating Brake and Universal Joint; 1,600 yards of steel wire rope; combined 3-furrow plough and 5-tined cultivator; seven snatch blocks and claw anchors complete; four fixed anchors; 20 rope porters; with the necessary levers, crowbars, mallets, and chains	£250
--	-------------

For Prices of Portable Engines to work with this Tackle, see page 30.

IMPLEMENTS, &c.

				£	s.	d.
Three-furrow	Balance Plough , fitted with scarifying and digging breasts	...	...	65	0	0
Four-furrow	ditto ditto ditto	...	...	80	0	0
Six-furrow	ditto ditto ditto	...	...	95	0	0
Eight-furrow	ditto ditto ditto	...	...	120	0	0

If fitted with steel skifes, in place of cast iron, which are strongly recommended (especially for stony or excessively hard land), £1 10s. per skife extra.

				£	s.	d.
Patent Turning Cultivator , 5 tines	...	...	...	60	0	0
Ditto ditto 7 "	...	...	...	70	0	0
Ditto ditto 9 "	...	...	...	80	0	0
Ditto ditto 11 "	...	...	...	85	0	0
Ditto ditto 13 "	...	...	...	95	0	0

					£	s.	d.
Patent Balance Cultivator , 5 tines, with slack gear	...	...	...	(£45 0 0)	55	0	0
Ditto ditto 7 "	...	...	...	(£50 0 0)	55	0	0
Ditto ditto 9 "	...	...	...	(£55 0 0)	60	0	0

Patent Turning Harrow	...	...	...	...	85	0	0
Ordinary Steam Harrow	...	...	...	...	50	0	0
Extra Strong Grubber or Knifer	...	...	...	...	90	0	0
Subsoil Plough	...	...	...	...	100	0	0
Steam Roller	...	...	...	...	45	0	0
Steam Drill	...	...	...	...	95	0	0
Rope Porters , large	...	...	...	...	1	10	0
Ditto small	...	...	...	...	1	0	0
Watercart , with Pump and Leather Hose (on two wheels)	...	...	...	...	25	0	0
Ditto on four wheels	...	...	...	...	30	0	0
Draining Engine , (14-h.p.)	...	...	...	...	765	0	0
Draining Plough	...	...	...	...	60	0	0
Ditching Machine	...	...	...	...	100	0	0

Engines and Centrifugal Pumps.

Engines.	£	Ordinary quantity delivered per minute.	Price of Pump.	Price of 60 feet best Leather Belt for same.	Total. Engine, Pump, and Belt.
		Gallons.	£ s. d.	£ s. d.	£ s. d.
6-horse power	180	1,000	50 17 0	6 2 6	236 19 6
8-horse power	210	1,400	57 4 0	6 15 0	273 19 0
10-horse power	240	2,200	73 4 0	7 7 6	320 11 6
14-horse power	335	3,200	116 0 0	9 5 0	460 5 0
25-horse power	540	5,600	183 0 0	10 10 0	733 10 0

If mounted on four wheels, or with swivel suction pipe, an additional charge is made.

Circular Saw Bench.

With 2-ft. saw, and table 5 ft. 6 in. by 2 ft. 6 in., fitted with roller at each end £30

Sleeping Van £85

Wearing Parts.

	£	s.	d.	
Shares, cast iron	0	11	0	per dozen.
Ditto ditto (S 53 and 54)	0	12	6	„
Large Shares, 10 in.	0	15	0	„
Breasts, steel	0	15	0	each.
Skifes, with Patent adjustment, iron	0	9	6	„
Ditto ditto steel (strongly recommended), according to weight, 35s. to £3, and up to	4	10	0	„
Slades	0	1	0	„
Scarifying Breasts	0	2	6	„
Digging Breasts	0	4	0	„
Cultivator Points (B 89), 4½ in., short top	0	11	0	per dozen.
Ditto ditto (G 11), heart-shaped with rib... ..	0	11	0	„
Ditto ditto (G 46), ditto short	0	14	0	„
Ditto ditto (G 47), ditto long	1	0	0	„
Ditto ditto (G 50), 4½ long	1	0	0	„
Ditto ditto (G 55), 2½ long	0	11	6	„
Ditto ditto (J 21), points 2½ in. long	1	7	0	„
Ditto ditto (B 68), 10 in.	0	12	0	„
Ditto ditto (G 22), ditto with long tops	1	0	0	„
Ditto ditto (B 88), 8 in.	0	12	0	„
Ditto ditto (B 75), 4½ in.	0	10	6	„
Ditto ditto (G 5), ditto, with long tops	0	14	6	„
Ditto ditto (G 11), heart-shaped	0	10	0	„
Ditto ditto (G 54), ditto with long tops	0	15	0	„
Other sizes of Points may also be obtained				
Porter Pulleys	0	2	6	each.
Ditto Wheels, large	0	3	0	„
Ditto ditto small	0	2	0	„
Ditto Brackets, large	0	6	0	„
Ditto ditto small	0	2	6	„

Prices of Rope

	£	s.	d.	
Best hard steel wire rope, for 30-horse power tackle	15	0	0	per hundred yards.
Ditto for 20 horse ditto	15	0	0	„ „
Ditto for 14-horse ditto	12	10	0	„ „
Ditto for 12 and 8-horse power tackle	10	10	0	„ „

Man's time while starting machines in England, ~~5~~ 25/- per week, Farmer to find board and lodgings, and pay all travelling expenses.

FOWLER'S
STEAM TRACTION MACHINERY.

JOHN FOWLER & CO.'S TRACTION ENGINES

Are specially designed for the purpose of pulling heavy loads on roads of every description, and for being applied as ordinary Steam Engines, whenever required, at a moment's notice.

The steam-generator is of the locomotive boiler class. It is provided with a dome, which increases the steam space, thus avoiding the tendency to priming. The large grate and heating surface of this kind of boiler permits a comparatively slow combustion of the fuel, and a corresponding saving of coal and of the wear and tear of the boiler.

The exhaust, before entering the chimney, is blown into a receiver surrounding the stalk. In this way the objectionable noise generally produced by the blast is completely obviated.

An arrangement for heating the feed-water is supplied, if required, which, at the same time, condenses part of the exhaust steam, thus saving fuel as well as water.

The engines are provided with one steam cylinder ; in this way the whole machinery is not only greatly simplified, but the reduction of wearing parts and of friction causes a remarkable increase of economy and efficiency in working ; saving, as proved by actual and careful experiments, as much as one-sixth of the fuel used by a corresponding double-cylinder engine.

The cylinder is steam-jacketed, and, like the boiler, completely lagged.

The bearings of the crank-shaft, the hind-axle, and the only intermediate shaft, are carried by the side-plates of the fire-box in such a way that the tension arising in these bearings during work cannot affect the rivets and stays of the boiler. Thus greater durability of the boiler is secured, and a number of cumbrous brackets and plummer blocks are dispensed with.

All our engines are provided with a fly-wheel, from which by means of a belt, any kind of machinery may be worked at a moment's notice. Governors are only employed under special circumstances, as for thrashing, &c.

There is a slow and a quick speed gear for the road-motion of the engine. Either speed can be thrown in or out of gear immediately, as required.

The two hind-wheels are connected by a differential gear, which permits each wheel to revolve at its proper speed whilst turning round corners, without slipping on the ground. Thus great facility of movement is obtained.

Generally our engines are provided with one front-wheel only, standing, therefore, on three wheels. This makes the whole engine much handier and easier to steer, and avoids, to a great extent, the shocks and vibrations caused by a two-wheel fore carriage. Only where engines are intended to go into fields and over very soft land, we prefer to provide them with four wheels.

Our driving road-wheels are either solid wrought-iron wheels, which we prefer where the engine has frequently to work on soft land, or they are provided with india-rubber rings, covered by iron plates. The latter wheel, especially on hard, slippery ground, has the advantage of a greater amount of adhesion, and acts as a spring for the engine itself. The specialty of our india-rubber wheel is the construction of the tyre. It is not, as usual, one whole ring, but formed of pieces of india-rubber, which can readily be exchanged when damaged by accident.

A small winding-forward drum, with a certain amount of wire rope, attached to and worked by these engines, will be found very useful for pulling heavy loads up very steep inclines, or for getting the engine out of difficulties.

We provide our engines with large tanks, thus considerably reducing the frequent stoppages and difficulties caused by the want of a sufficient supply of water

The tanks are filled by suitable hand-pumps, or other means provided for the purpose.

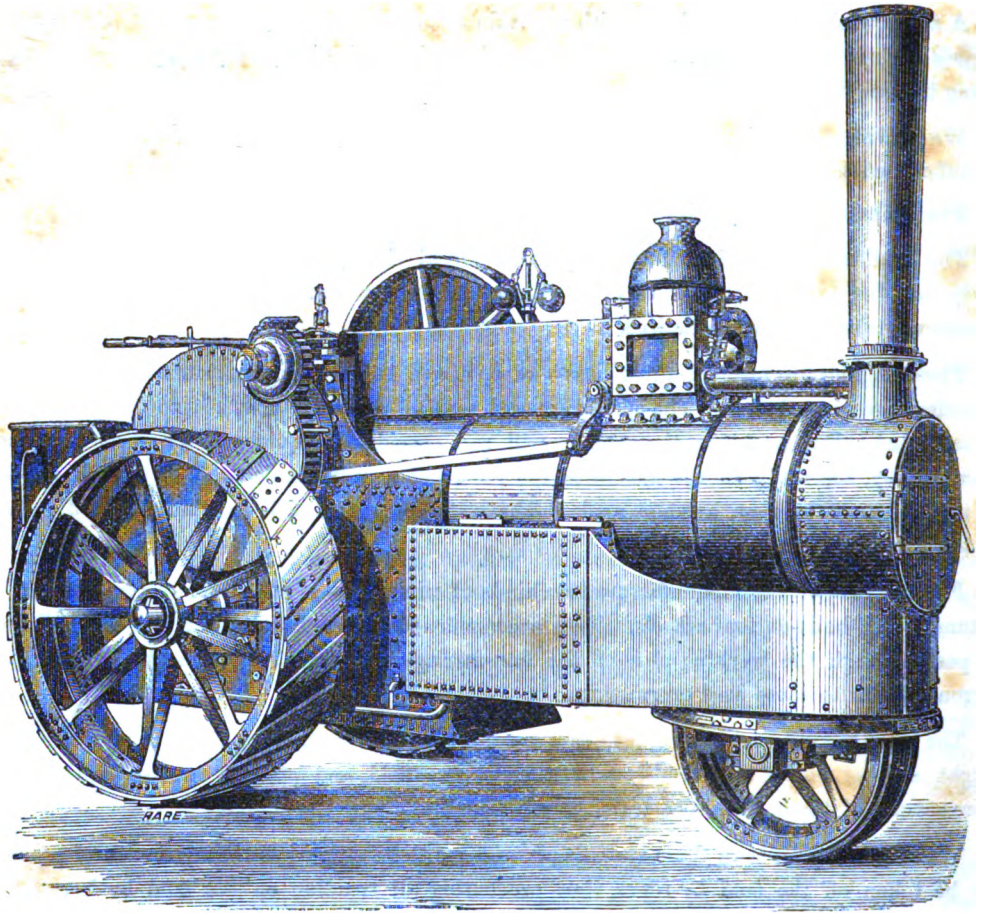
The best material and workmanship is employed throughout, and especially cast-steel is largely used for parts more liable to wear. Complete steel gear and shafting, which we strongly recommend, is supplied when desired.

These engines are made of three sizes—of 6, 8, and 12 horse-power, nominal. Their chief dimensions are given below. The speeds are— $1\frac{1}{4}$ to 3 miles per hour, at 150 to 160 revolutions of the engine. But, as a rule, the engines will run considerably quicker. The coal consumed varies greatly, according to the nature of the road, but may be set down at $1\frac{1}{2}$ to 4 lb. per ton per mile of gross load on average roads. The water consumed will vary from 1 to 3 gallons per ton per mile.

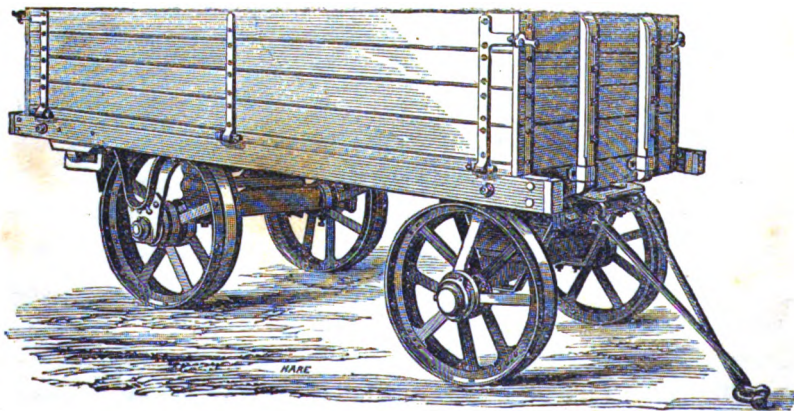
For these engines we manufacture two kinds of waggon—of which the large one carries six tons, being built on four wheels. They are constructed in such a manner that the pull does not pass through the working-pins of the fore-carriage, but direct through the body of the waggon, similar to those used on railways.

The smaller kind—an agricultural cart, on three wheels—will carry three to four tons. It is light, so that horses may readily take it about in a field, and place it loaded on the road, where several of them, forming a train, may be taken along by the engine.

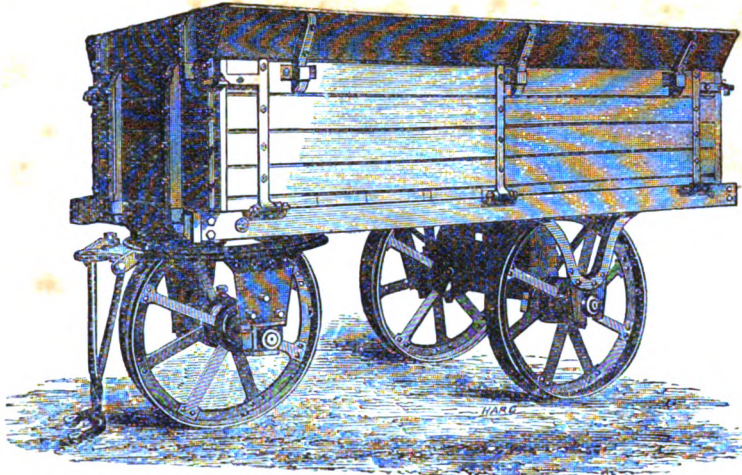
We also construct both these systems of waggon to be steered so that agricultural produce may be taken off the field by ropes, thus preventing all treading on the land by horses, &c. This patent waggon will be of great importance in the autumn, and in carrying sugar cane out of the fields, or any position which is hilly, and where horses have difficulty in removing the crops.



12-horse power Traction Engine.



Traction Waggon.



Agricultural Cart.

DIMENSIONS.							
Nominal horse power	...	...	...	...	6 h. p.	8 h. p.	12 h. p.
Cylinder—diameter	...	...	...	...	7½ inches	9 inches	10½ inches
„ stroke	...	...	...	...	10 „	12 „	12 „
Grate surface	...	...	...	...	3 ft. 6 in.	5 ft. 6 in.	7 ft. 6 in.
Heating surface	...	...	...	...	114	150	174
Ordinary number of revolutions	...	...	...	...	160	155	150
Slow and quick speed	...	...	...	...	1½ 3 miles	1½ 2½ miles	1½ 2½ miles
Length of engine	...	...	...	...	13 ft. 7¾ in.	15 ft. 2 in.	16 ft. 3 in.
Breadth of engine	...	...	...	...	6 ft. 4 in.	7 ft. 2 in.	8 ft. 1½ in.
Weight, in working order	...	...	...	...	7 tons	9 tons	11 tons
Amount of water carried	...	...	...	...	230 gallons	270 gallons	320 gallons
Amount of coal carried	...	...	...	...	8 cwt.	10 cwt.	12 cwt.

PRICES.

					6-Horse power.	8-Horse power.	12-Horse power.
Price of engine with iron wheels	...	...	...	...	330	380	500
Price of engine with india-rubber wheels	...	...	...	...	500	580	800
Extra for winding-forward drum	...	...	...	...	20	20	20
„ for governor	...	...	...	...
„ for feed-water heater	...	...	...	...	10	10	10
„ for steel gear	...	...	...	...	35	40	45
Large waggon	...	...	...	...	62		
Light agricultural cart	...	...	...	...	40		

RAILWAY COMMUNICATION WITH LEEDS.

